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THE HISTORY OF THE TYPEWRITER:

Being an Illustrated . .
Account of the Origin,
Rise and Development
of the Writing Machine.

BY

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"I hear, I balance, I assess, but judge I do not."

Ayesha.

movement, actuated by a spiral spring, *G*, for imparting the rapid movements to the type-wheel; now, to cause the partial or complete rotation of the type-wheel a most ingenious system of universal bars, *I*, arranged one within the other, twelve in all, six being placed each side of the type-wheel gear. These bars rest upon the ends of the key-levers, which are notched so as to raise its universal bar, and, since there are thirty-six characters, it follows that each universal bar is responsible for three characters being brought to the printing point. Resting upon each universal bar is a small hammer, *H*, whose shaft converges from a slotted ring, it is the inner extremity of the hammer shaft (which is oscillated by a depression of a key and universal bar) which governs the partial or complete revolution of the type-wheel; for instance, suppose we depress a key, the hammer is tilted and thereby rocks its inner extremity inwards, and the same operation simultaneously releases the spur-wheel pallet, and, the type-wheel being free, its spring causes it to rotate rapidly, but since there is a projection on the type-wheel shaft, it is immediately arrested by the hammer-shaft projection, and the striking hammer, *J*, lets fly against the type, leaving an impression upon the paper attached to the line-frame, *K*. Upon releasing the key, the projection resumes its normal position and the pallet having engaged with the spur-wheel, the type-wheel is necessarily stationary until the depression of a another key. Above and across each key-lever towards the front of the machine are two oscillating bars (before mentioned) across which at right angles, is a lever, *L*, which is automatically raised by the depression of the key; each oscillation of these bars raises the type-wheel the necessary distance, that is, to the second or third rows of type on the type-wheel, and to assist in a rapid return of the type-wheel, a flat spring, *M*, is constantly pressing on the top of the type-wheel shaft. The lever for raising the type-wheel may be compared with the shift-key levers embodied in the construction of the "Hammond" typewriter, and the small hammer-headed like projection to the stop or index pins which, by means of the stop arm (also identical in the Pratt and Hammond machines), which arrests the movement of the type-wheel immediately the requisite type has been brought to the proper centre.

"Second, the impression is effected by a hammer, *J*, having a face equal in extent to a single type, which face is covered with a strip of ivory, backed by a small spiral spring so as to break the force of the blow; this hammer

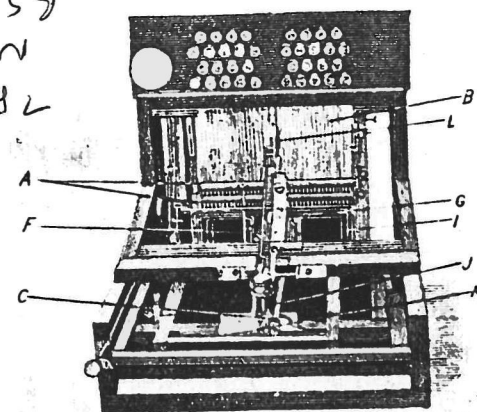


FIG. 27

strikes against the face of the several types the instant they are brought within its range, a sheet of carbonized paper, held in contact with a sheet of writing paper, being suspended between the hammer and the type-wheel. Transparent transfer paper may be also employed as well to enable the operator to see the progress of the writing as to preserve a copy. The hammer is operated by an oscillating bar, *A*, with which it is connected by a small rod, *N*, hinged to its butt. This rod has on its lower end a catch, which engages an arm projecting from the oscillating bar, *A*, and, having an eccentric movement, it causes it to act in a manner somewhat analogous to the hopper of a piano. The depression of a key lowers this eccentric arm, and retracts the rod of the hammer. Just as the key has been carried through to its full movement, and the corresponding type brought to a proper position, the catch is pushed off the eccentric and the hammer is impelled against the type by a spring, *O*. When the key is released the arm of the oscillating bar engages the catch, and the hammer is ready for a new stroke. It is, however, necessary by this arrangement to release one key before striking another; and it is this necessity that limits the rapidity of the instrument, which otherwise might have struck off printed characters as fast as the piano can yield consecutive notes.

"Third, now for the feed of the paper. A square open frame, *P*, which for distinction may be termed the page-frame, slides in vertical grooves formed in the upright part of the case, in the plane of the type-wheel. Within this,

The accessibility of parts, as well as the solidity and strength of the typebar hangers; the conveniently arranged paper fingers are also very noticeable and valuable features.

The machine is equipped with the usual devices for writing on ruled lines, and for changing the line space, and the carriage can be released from either side, as may be desired or more convenient.



FIG. 55

The Densmore.

The essential feature of the Densmore typewriter, when first submitted to the public, was its supplemental type-bar, as shown in the accompanying figure. It is pointed out that the force of the finger raises this bar and enables the principal bar to gradually overcome the resistance or inertia which, in other instruments, can only be overcome by a sudden strain or jerk. The secondary bar slides upon the principal bar with gradually accelerated speed and force, and, taking off all lateral

strain, permits the principal bar to rise with unvarying accuracy.

Another peculiar feature of the Densmore is its great rigidity and strength, the result of the framework being made in one solid casting. There being no screws or joints in the framework to get loose, there can be no twisting, warping, or other defect, and so the whole machine remains as tightly braced together at the end of many years' constant use as it is the day it leaves the factory.

It will be observed that the keyboard of the Densmore follows what is termed the Standard arrangement, but particular attention should be paid to the duplicate shift-key, enabling the change of case to be made by either hand, as may be more convenient, and to the "back-spacer" key, upon which the Densmore people set great store. The effect and value of the key will be readily understood. Every time the key is struck, the carriage goes back one tooth in the rack. Under ordinary conditions, when too much space has been left, or the space-bar inadvertently struck, it is necessary to leave off writing, and raising the hands to the carriage, gently coax it back to the required position. And everyone knows how tedious this operation is. It generally happens that instead of one tooth we send it back two or more teeth, and then have to space forwards again by means of the space-bar. If we assume that we have sent it back twice, and space once to make sure, then we find that it was in the proper position, and that after all we have left a double space.

Almost from the earliest days of the career of the Densmore, a great point has been made of its ball-bearing type-bar, as seen in the illustration (Fig. 56). The wear and tear of the type-bars in their hangers has always presented a difficult problem for the typewriter inventor. We shall see how adjusting screws have been provided, and how forced alignment has been adopted in order to remedy an evil which it has been considered must of necessity arise. But in the Densmore, it is claimed that the difficulty is surmounted by the introduction of these ball-bearings, and certainly, from an inspection of work executed upon a Densmore of several years' constant use, we consider that there is much to be said in support of the makers' contention. As an example of the practically unlimited wear they afford, it is stated that the first model of the ball-bearing type-bar was used for a year at hard work as a test before adoption (in 1895), and

held its alignment perfectly. An examination of the type-bar joints at the end of that time showed practically no wear or play. A further very exacting test was then given them, the type-bars being set to work by machinery, and being made to strike upwards of two million blows. The test was regarded as the equivalent of three years' very hard work, and again no wear was perceived.



FIG. 56

After this it was decided to introduce ball-bearings wherever they could be introduced to advantage, and as a result the makers now say that the machine "bristles with balls all over."

The carriage of the Densmore is exceedingly light, and moves speedily with very little tension. Again, ball-bearings have been brought into use, and this aids in its light running powers. The carriage does not lift, but the platen is made to swing forward, so that the writing is brought into sight in a moment. The platen is so made that it can be lifted off the machine, carrying with it an unfinished piece of work, and another platen substituted for any special requirement, such as stencil cutting, manifolding, etc.

There is a graduated scale on the paper table, which will permit the paper always being fed in at the same relative position, thus securing absolutely even margins. Facilities afforded for throwing the line spacing out of gear, and the pressure of the feed roll can be lightened in order to permit of the adjustment of paper, or the insertion of a number of thicknesses for carbon work. The feed roll automatically adjusts itself by the mere act of swinging the platen into its normal position.

Every care has been taken to secure the escapement of the Densmore being rapid and sure. Running as the carriage does on ball-bearings, and with low tension, and being itself very light and well-balanced, there is very little resistance to be overcome, and speed is thereby assured.

The original features of the Densmore are not, however, yet exhausted, for particular attention should be directed to the "justifier," a device which, we believe, finds no exact counterpart in any other machine. This is a sort of gauge, by which the paper can be moved to the left for any portion of a full space. As is well-known, the space occupied by a letter is one-tenth of an inch. But it may so happen that the space available for writing upon is just one letter too little, that is to say, four letters are required to be written in a space which can only carry three letters under ordinary conditions. To meet such instances, it has been the custom to break the word, if a disyllable, or leave an unsightly gap, and type it in the next line. But this device gets over the difficulty, and the four letters can be compressed in the shorter space. Even the most perfect operator will make a mistake now and then, and only finds it out afterwards. A mistranscribed outline, such as *me* for *him*, *can* for *come*, and so on, will require correcting. It would require a lot of maneuvering in ordinary circumstances to make this correction in a slightly manner, but with the justifier to assist us, we erase the error, and a little bit is taken off the tenth of an inch occupied by each letter, and saved up to the last, when it will be found that the accumulated savings will just accommodate the new letter. This device, in conjunction with the pointer (see illustration), will render corrections of all kinds a very easy matter.



FIG. 57